

CLAIMS

What is claimed is.

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- 1 1. A micro electromechanical (MEMS) package comprising:
- 2 a semiconductor device;
- 3 a first MEMS disposed in a first structure, and wherein the first MEMS is
- 4 disposed over the semiconductor device;
- 5 an embedded MEMS in a conveyance that is disposed over the semiconductor
- 6 device, wherein first MEMS is accommodated in a via in the conveyance.

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- 1 2. The MEMS package according to claim 1, wherein the first MEMS is selected
- 2 from a capacitor, a switch, a power supply, and an oscillator.

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- 1 3. The MEMS package according to claim 1 further comprising:
- 2 encapsulation material disposed over the first MEMS and the conveyance.

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- 1 4. The MEMS package according to claim 1, wherein the semiconductor device
- 2 further comprises:
- 3 an active surface;
- 4 a first electrical contact array upon the active surface;
- 5 a second electrical contact array upon the active surface; and further comprising:
- 6 a sealing structure surrounding the first electrical contact array.

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1 5. The MEMS package according to claim 1, wherein the semiconductor device
2 further comprises:

3 an active surface;
4 a first electrical contact array upon the active surface;
5 a second electrical contact array upon the active surface; and further comprising:
6 a sealing structure disposed around the first electrical contact array, wherein the
7 sealing structure comprises a solder ring.

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1 6. The MEMS package according to claim 5, wherein the sealing structure is
2 disposed between the active surface and the first MEMS.

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1 7. The MEMS package according to claim 1, wherein the first MEMS is at least one
2 variable capacitor.

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1 8. The MEMS package according to claim 1, wherein the first MEMS is at least one
2 variable capacitor and further comprising:
3 at least one third MEMS selected from a switch, a capacitor, a variable capacitor,
4 an oscillator, a power supply, and combinations thereof.

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1 9. The MEMS package according to claim 8, wherein the third MEMS is disposed in
2 a third structure that is spaced apart from the first MEMS.

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1 10. The MEMS package according to claim 1, wherein the first MEMS is selected
2 from a bridge oscillator, a cantilever oscillator, and combinations thereof.

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1 11. The MEMS package according to claim 1, wherein the first MEMS is a hollow
2 oscillator.

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1 12. The MEMS package according to claim 1 further comprising:
2 encapsulation material disposed over the semiconductor device.

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1 13. The MEMS package according to claim 1, wherein the first structure comprises
2 material selected from monocrystalline silicon, polysilicon, silicon on oxide, and silicon on
3 sapphire.

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1 14. A process of forming a micro electromechanical (MEMS) package comprising:
2 providing a semiconductor device;
3 providing a conveyance with at least one embedded MEMS device disposed
4 therein; and
5 disposing the conveyance over the semiconductor device, wherein the at least one
6 embedded MEMS device communicates electrically to the semiconductor device.

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1 15. The process according to claim 14, wherein the at least one embedded MEMS
2 device is selected from a switch, a capacitor, an inductor, an oscillator, a power supply, and
3 combinations thereof.

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1 16. The process according to claim 14, wherein the conveyance comprises a via
2 disposed therein, the process further comprising:
3 providing at least one detached MEMS device in a first structure; and
4 accommodating the at least one detached MEMS device through the via, upon the
5 active surface.

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1 17. The process according to claim 14, wherein the conveyance comprises a via
2 disposed therein, the process further comprising:
3 providing at least one detached MEMS device in a first structure;
4 placing the at least one detached MEMS device on the semiconductor device; and
5 accommodating the at least one detached MEMS device through the via, upon the
6 active surface.

1 18. The process according to claim 14, wherein the conveyance comprises a via
2 disposed therein, the process further comprising:
3 providing at least one detached MEMS device in a first structure;
4 accommodating the at least one detached MEMS device upon the active surface;
5 providing a sealing structure; and
6 disposing the sealing structure in a manner sufficient to isolate at least one of the
7 at least one detached MEMS device.

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1 19. The process according to claim 14 further comprising:
2 forming an integrated package comprising the semiconductor device and the
3 conveyance.

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1 20. The process according to claim 14 further comprising:
2 forming an integrated package comprising the semiconductor device, the
3 conveyance, and at least one detached MEMS device in a first structure, wherein the at
4 least one detached MEMS device is accommodated upon the semiconductor device.

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1 21. The process according to claim 20 further comprising:
2 encapsulating the detached MEMS device and the conveyance to form an
3 integrated package.

1 22. The process according to claim 14 further comprising:

2 encapsulating the semiconductor device to form an integrated package, wherein
3 the at least one detached MEMS device is accommodated upon the semiconductor
4 device.

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1 23. A process comprising:
2 providing a semiconductor device;
3 accommodating a detached micro electromechanical structure (MEMS) device
4 upon the semiconductor device;
5 providing a conveyance over the semiconductor device and around the detached
6 MEMS device; and
7 contacting encapsulation material with at least one of the semiconductor device,
8 the detached MEMS device, and the conveyance to form an integrated MEMS package.

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1 24. The process according to claim 23, further comprising:
2 embedding a MEMS device in the conveyance.

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1 25. The process according to claim 23, further comprising:
2 providing a sealing structure; and
3 interposing the sealing structure upon the semiconductor device in a manner
4 sufficient to isolate at least one of the at least one detached MEMS device.

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26. A micro electromechanical structure (MEMS) package comprising:
a semiconductor device;
a sealing structure disposed over the semiconductor device;
at least one detached MEMS in a first structure disposed over the sealing
structure, wherein the at least one detached MEMS is selected from a capacitor, a switch,
an oscillator, an inductor, a power supply, and combinations thereof;
at least one embedded MEMS in a conveyance, wherein the at least one
embedded MEMS is selected from a capacitor, a switch, an oscillator, an inductor, a
power supply, and combinations thereof; and
encapsulation material disposed over at least one of the conveyance and at least
one of the at least one detached MEMS, and the semiconductor device.

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27. The MEMS package according to claim 26, wherein the semiconductor device
further comprises:
an active surface;
a first electrical contact array upon the active surface;
a second electrical contact array upon the active surface;
wherein the at least one detached MEMS makes electrical contact with the first
electrical contact array, and wherein the at least one embedded MEMS makes electrical
contact with the second electrical contact array.

1 28. The MEMS package according to claim 26, wherein a first of the at least one
2 detached MEMS is a variable capacitor and a second of the at least one detached MEMS is
3 selected from a switch, a capacitor, a variable capacitor, an oscillator, and a power supply.

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1 29. The MEMS package according to claim 26, wherein the at least one detached
2 MEMS is selected from a bridge oscillator, a cantilever oscillator, a hollow bridge oscillator, a
3 hollow cantilever oscillator, and combinations thereof.

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1 30. The MEMS package according to claim 26, wherein the at least one embedded
2 MEMS is selected from a spiral inductor and a helical inductor.

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